Volume 11 Number 4 weather.gov/sandiego October 2005

Coast to Cactus Weather Examiner

National Weather Service - San Diego

The National Weather Service Spotter Newsletter for Extreme Southwestern California

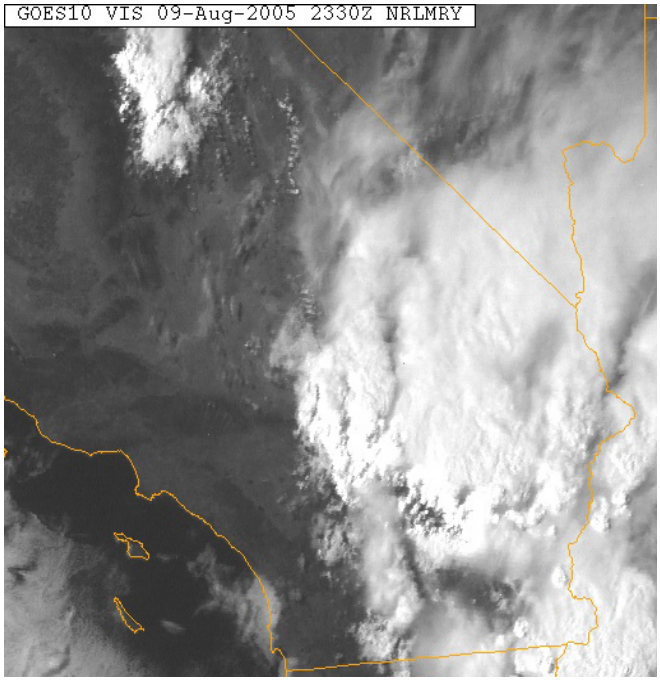
A Super Monsoon

Persistent Thunderstorms

A strong ridge of high pressure from the central Great Plains to northern California kept a persistent monsoonal flow across southwestern California. The moist flow fueled thunderstorms in the mountains and deserts from July 19 to August 9, an unusual stretch of 22 consecutive days.

Weak to moderate southeast flow brought a continuous feed of moisture from the Gulf of Mexico into the region, and the midday sun was all it took to set off numerous rounds of showers and thunderstorms each day in the mountains and deserts. East flow was strong enough on a couple of days in late July to send a few showers and thunderstorms into the valley and coastal areas. Local flash flooding was observed on many days. Monthly rainfall in the mountains was over 200% in many areas, while areas west of the mountains generally reported little to none, except with isolated thunderstorms.

A total of 73 flash flood warnings were issued across the four-county region between July 19 and August 9, and on each day except one.



In This Issue

An Impressive Lightning Show

On the night of September 20 and the morning of September 21, an impressive lightning display accompanied numerous thunderstorms that tracked across the region. Many commented that this was the most active thunderstorm event in memory. A weak trough of low pressure off the coast combined with moisture from Baja California and sent a batch of thunderstorms through the region. The big story was the lightning since actual

rainfall amounts were generally light (any heavy showers were short) and no severe weather was reported.

Many people were awakened and could not sleep further since the thunder was so loud and persistent. Pets and children were frightened by the loud thunder. The bright flashes of light and the crashing noise was something Southern Californians, of any species, just aren't used to.

Santa Ana Season

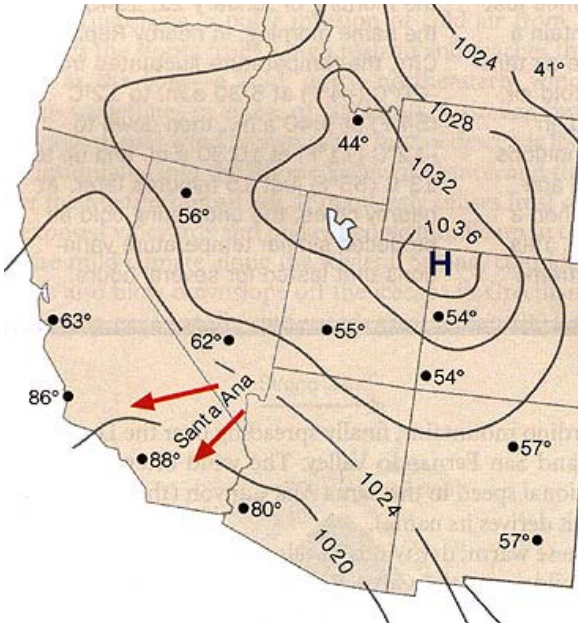
Santa Ana winds are strong, dry offshore winds that blow from the east or northeast. These winds are strongest below passes and canyons of the coastal ranges of Southern California. The name is derived from the Santa Ana Canyon, which is susceptible to these winds.

The complex topography of Southern California along with various atmospheric conditions create numerous scenarios that may cause widespread or isolated Santa Ana events. Santa Ana winds develop when a region of high pressure builds over the Great Basin (the plateau east of the Sierra Nevada and west of the Rocky Mountains including Nevada and western Utah). Air moves from high pressure to low pressure; in this case, from the Great Basin to the coast. This pressure pattern often follows the passage of an upper low through the interior west. If the upper low moves into northern Mexico or Arizona, the upper level winds will be from northeast, and enhance the northeast surface flow. The cold air associated with the upper low forms a dry front coming from the northeast. Strong subsidence associated with the cold air following these fronts forces strong winds aloft downward to the surface. This creates a turbulent mountain wave that touches the surface on the lee side of the mountains. On rare occasions, there may be precipitation with the system and a "wet Santa Ana" results, but most of the time a Santa Ana event brings clear skies and warm weather. Clockwise circulation around this high pressure area and subsidence (sinking motion) forces

air down the mountain slopes from the higher plateau. The air warms and dries out, due to heating by compression, and accelerates as it descends toward the coast. Sometimes the winds are quite localized and narrow corridors or rivers and nearby areas escape them.

Santa Ana winds occur mainly during Fall and Winter and are most common during December. Summer events are rare. A reasonably strong event can produce sustained wind speeds of 30 to 40 mph with gusts over 60 mph. During exceptional events the top gusts can exceed 100 mph. The strongest winds usually occur during the night and morning due to the absence of a competing sea breeze.

The impacts of these winds are numerous. There is always a high fire danger during these events. Trees and power lines are toppled, leading to property damage and power outages. High profile vehicles are at risk of being blown over. Turbulence and low level wind shear adversely affect aircraft, while strong winds and associated waves can present great danger to boaters.



Fall events can bring hot weather as well as strong winds. Most high temperature records in coastal California have occurred during a hot Santa Ana. Legend and lore have sprung from these uncomfortable conditions. Early Mexican residents called them *los vientos del diablo* - the devil winds. It is a strange time for residents near the coast because their mild climate turns into the Sahara for a time. Fires increase, crime seems to go up, and numerous health conditions worsen, such as allergies. Some claim earthquakes are more likely during this "earthquake weather." Like the time during a full moon, it just seems that more weird things happen.

We Want You

The NWS in San Diego is working on a bold new way of obtaining vital weather information that will increase the accuracy of our forecasts and warnings. There is a growing network of weather stations across our region that report hourly weather information directly to our office and augments the cooperative (coop) weather network already established.

How will it help us? Our mission is to protect lives and property from the adverse affects of weather. Our region is replete with unique climates and countless microclimates. Many weather phenomena are very small in scale, things like thunderstorms or strong winds, which can miss our equipment and our detection. Our dense population increases the impact whenever threatening weather occurs. With the new network, we will know better exactly what is going on, where, and when. With this added information, and with the continued use of helpful spotter reports, more accurate forecasts and warnings are on the way.

Among our more than 1,000 weather spotters, we count 161 of you who have full weather stations installed on your property. Some of you have posted the weather data online. Others of you are part of the APRS/WXNET group of observers who have data posted on the wxqa.com web site. We hope to gain quick access to the data by typing a few keystrokes to find out weather conditions at a location. This would be easier and faster than attempting a phone call to a spotter when we need the data and taking the chance the spotter is available. Of course if more information is needed, a personal contact would be necessary.

Look for the web link headlined on our home page **weather.gov/sandiego** as "You Can Help - San Diego Mesonet - Join Us" for further information and to apply. The site will explain the vision of the project, the kind of commitment required, and it shows you how to be considered.

Quarterly Summary

July

Westerly flow aloft and a weak upper trough kept the weather dry, and temperatures in check through the first ten days of July. Then, a major shift in position of the subtropical high northward brought warming toward the middle of the month, followed by the Summer Monsoon. Generally hot and humid conditions prevailed inland, while moderate conditions held along the coast with onshore flow most days. Temperatures still averaged one to three degrees Fahrenheit above normal for the month, except near the coast, where some spots were a bit cooler than normal.

San Diego - Lindbergh Field Data

	Max	Min	Avg	Rain
JUL	74.4	65.5	70.0	0.01
Normal	75.8	65.9	70.9	0.03
Anomaly	-1.4	-0.4	-0.9	-0.02
% of normal				33%
Max	86	70		0.01
Min	69	61		

August

Persistent monsoonal flow continued across southwestern California early in the month. A weak trough of low pressure and southwest flow aloft turned off the monsoon during the latter half of the month. Temperatures were generally below normal near the coast during the first three weeks, then strong high pressure aloft brought a stretch of very warm conditions from the 26th through the 28th when a few records were set. Monthly average temperatures were slightly below seasonal normals.

San Diego - Lindbergh Field Data

	Max	Min	Avg	Rain
AUG	75.6	66.4	71.0	Trace
Normal	77.5	67.4	72.5	0.09
Anomaly	-1.9	-1.0	-1.5	-0.09
% of normal				0%
Max	84	71		Trace
Min	71	62		

September

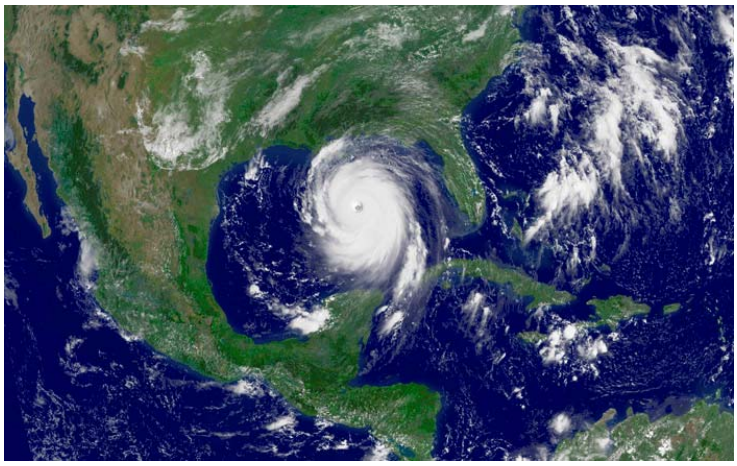
A persistent upper ridge over the southern states coupled with an upper trough along the west coast kept Southern California dry and seasonally cool much of the month. On the 19th a burst of tropical moisture produced widespread thunderstorms with considerable lightning, but because of their rapid movement, produced rainfall of generally less than one half inch in any one spot. This event was followed by a deep trough along the west coast for mostly dry and cool weather. The final days of the month saw the first Santa Ana conditions with hot, dry winds over northern portions of the region. Average monthly temperatures were between one and four degrees below normal. No monsoon activity was noted during the month.

San Diego – Lindbergh Field Data

	Max	Min	Avg	Rain
SEP	74.1	62.9	68.5	0.10
Normal	77.0	66.1	71.6	0.21
Anomaly	2.9	3.2	-3.1	-0.11
% of normal				52%
Max	88	66		0.09
Min	69	59		

Hurricanes

The 2005 Atlantic hurricane season began as the most active on record, with four named storms (Arlene, Bret, Cindy and Dennis) by July 5. Twelve named storms formed by the end of August—the eleventh, Hurricane Katrina, became the most destructive hurricane to ever strike the U.S. It first struck southern Florida on August 25 as a Category One storm. It quickly re-intensified once it moved west into the warm Gulf waters, which were 2-3 degrees Fahrenheit (1-2 degrees C) above normal. Katrina continued to strengthen as it turned toward the northwest and eventually north during the next few days. Katrina's sustained winds reached 175 mph (150 knots) and its minimum central pressure dropped as low as 902 millibars (a measure of a hurricane's strength—the fourth lowest on record for an Atlantic hurricane). The storm's intensity diminished slightly as it approached the central Gulf Coast, but Katrina remained a strong Category Four storm until landfall along the Louisiana and Mississippi coasts on August 29. Although its intensity at landfall was less than that of Hurricane Camille, which devastated coastal Mississippi in August 1969, the size of Katrina, with hurricane force winds extending 120 miles from its center, was much larger and the destruction more widespread than Camille. The associated storm surge reached as far east as Mobile, Ala., inundating parts of the city. Large parts of Biloxi and Gulfport, Miss., were covered with water as a result of a 20 to 30-plus foot storm surge that reached far inland. The combination of strong winds, heavy rainfall and storm surge led to breaks in the earthen levee system that separates New Orleans from surrounding lakes and canals, leaving large parts of New Orleans under 20 feet of water. For more information about Katrina, click: **www.ncdc.noaa.gov/oa/climate/research/2005/katrina.html**.



Winter Outlook

During the months of January through March, typically the wettest months in Southern California, the Climate Prediction Center (CPC) predicts near normal precipitation for the Pacific southwest, but above normal temperatures. After a winter that brought the third highest amount of rainfall in 150 years, one wonders what this next winter will hold. No signatures of El Niño or La Niña are detected, so there is no global climate mechanism that would make forecasters lean one way or another. Another thing to consider on a more local scale is that on no occasion in the past 150 years in San Diego has a very wet season been followed by a very wet season. Of the two previous seasons in which more than 20 inches of precipitation were recorded (normal is 10.77 inches), rainfall was within about two inches of normal:

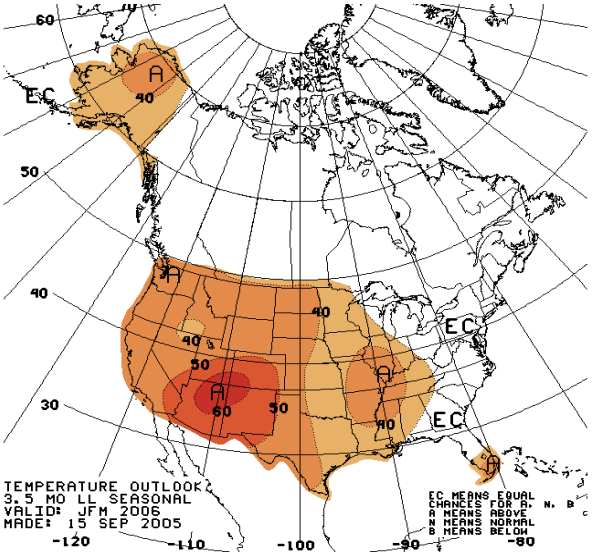
	Seasonal Precipitation	**Following Season**
1883-1884	25.97 inches	8.67 inches (1884-1885)
1940-1941	24.74 inches	13.05 inches (1941-1942)
2004-2005	22.49 inches	???? inches (2005-2006)

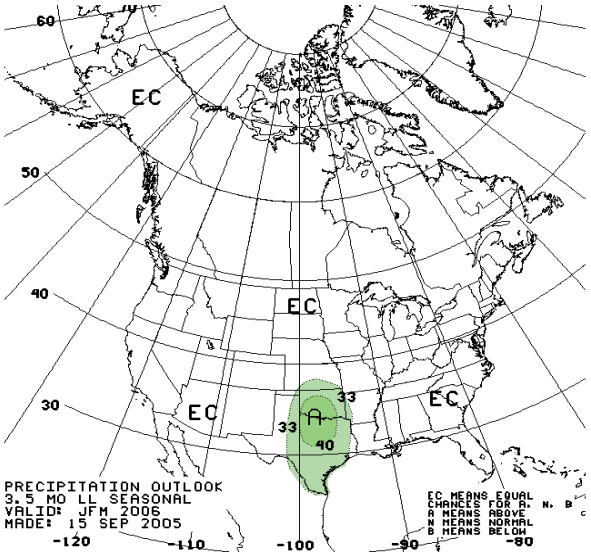
It should also be remembered that the Climate Prediction Center predicted near normal rainfall for the 2004-2005 winter season, showing that without any long term climate signals, predicting seasonal

rainfall is a very difficult prospect.

Experts were asked to predict a specific, hard seasonal total for San Diego – Lindbergh Field. Mike Halpert, CPC meteorologist, said "My intuition and forecasting skills tell me that this is going to be a drier-than-normal year. I'll say 8.5 [inches]." Bill Patzert of the Jet Propulsion Laboratory in Pasadena: "I think there will be a tendency toward La Niña as we get into the winter, and that will offset the warm North Pacific that gave us all those lows last year. I'm looking at what I call La Niña light. For San Diego, I'm saying 8 inches." Ed Aguado, climate professor at SDSU offered, "I'll say 17.5 inches. There's no rhyme or reason. The sea-surface temperatures aren't telling us anything, and there aren't any strong signals out there." Ivory Small, Science and Operations Officer at the NWS in San Diego, gave a purely climatological argument, "I think we still have some work to do to get back to normal after all those dry years. I'll go about an inch and a half above normal, about 13.25 inches." Steve Vanderburg, meteorologist intern at the NWS in San Diego said, "Last year we didn't have a strong El Niño and look what happened. I think we'll still have a decent year. I say 9.34 inches."

That being said, here are the CPC's temperature and precipitation outlooks for January through March. Above normal temperatures are forecast for Southern California (indeed most of the country). A no strong indication is given of precipitation being either above or below normal.





Spotter and Skywarn News

On September 13th, spotter training took place in Victorville where about ten new spotters joined us. It was a good way to train current and new spotters about the system and understand better what to report. Also on hand were a reporter and photographer from the Riverside Press-Enterprise, doing a feature story on our spotter program. They also came to the San Diego forecast office to complete the interview. The story is expected to appear in the P-E around Halloween. Look for it!

On September 14th, spotter training was held in Huntington Beach as part of a regular CERT meeting (Community Emergency Response Team). There were about 80 in attendance and most of them signed up to be spotters. From a recruiting standpoint, this is the most successful spotter training presentation I've been a part of. The group is custom-made for becoming weather spotters; they are well informed, communicate well, and have a genuine desire to serve the community and to help minimize hazards and loss of life or property.

We crashed through the 1,000 member barrier; there are now 1,033 spotters!

On the night of September 20th, we found out how lightning can be a very hazardous part of

thunderstorms. Usually, we are focused on flash flooding from heavy thunderstorm rains, or large hail and damaging winds from severe thunderstorms. But these thunderstorms gave us none of the usual hazards, except lightning. A couple spotter reports told us about lightning striking objects and knocking out power or destroying electrical equipment in several homes. Other reports were of lightning starting fires in the mountains. Numerous rainfall reports were received, which were very useful especially because exact times were given and rates were computed.

We appreciate very much the outstanding participation in last summer's persistent monsoon. There were 22 consecutive days of thunderstorms at least in the mountains and deserts. We were able to verify most of these warnings with spotter reports or other sources. (The ones for which we couldn't verify were mostly in very remote locations). As our numbers and the quality of the reports increase, more and more of our warnings are being issued as a result of a timely spotter report, or being verified by an essential report. The NWS is held responsible for each warning we issue, so we aren't crying wolf irresponsibly, and the quality spotter reports are taking on a more prominent role in helping us justify and verify our warnings. Thanks again for the fine reports!

We now have a new way of providing a heads up for upcoming significant weather. Our Information Technologist has enabled us to send broadcast emails to select spotter groups, informing them of upcoming weather to look out for. For example, when we see a big winter storm coming, we can email spotters in the areas we feel will be most impacted. This way, spotters will be primed and ready to report.

During major storm events, a ham radio operator is requested to operate the ham radio in our office among our forecasters, direct the communication traffic, and collect the most meaningful reports. In most cases Skywarn is activated during major winter storms. In rare cases Skywarn may be activated during summer monsoon thunderstorm outbreaks or Santa Ana wind events. Volunteers should be willing to work at least a few hours, however times are flexible. If you would be willing to do this, please contact Ed Clark, NWS Warning Coordination Meteorologist, at: Edwin.clark@noaa.gov.

If you have updates to your spotter information, like a change of address or phone numbers, new equipment, ham radio operation status, etc., please email me with them: miguel.miller@noaa.gov.

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Coast to Cactus can always be found by clicking on spotter and skywarn information.
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